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Preliminary study on the effects of attendance at dog training school on minimizing development of some anxiety disorders

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ABSTRACT

In Japan, the importance of problem behaviors in dogs has recently become more widely recognized. Many dogs in Japan are relinquished to shelters because of problematic behaviors, and anxiety-related disorders are one of the main causes of such behaviors. In many cases, dogs are euthanized because of behaviors associated with anxiety-related disorders. In the present study, the effects of attending puppy classes, attending training school sessions, living with other dogs, and the presence of children while dogs were puppies on later anxious behaviors were investigated. Questionnaires were distributed to dog owners and data pertaining to 307 dogs were obtained. Anxious behaviors in response to storms (hereafter referred to categorically as "storm") and fireworks were also investigated. There were significant associations between storm and age, storm and attending training school, fireworks and age, and fireworks and attending training school. In multiple comparison testing, there were significant differences between juvenile dogs and other groups with regard to fireworks, and reduced anxious behaviors were significantly associated with training school attendance in the storm and fireworks subgroups. The results of this study suggest that attending training school reduced some anxiety-related behaviors. Notably, however, we did not investigate the effects of the regularity or frequency of training school attendance, or the content of such training sessions in this study. Therefore, the effects of these things on anxiety-related behaviors require further investigation.

Introduction

In Japan, the importance of problem behaviors in dogs, for example, separation anxiety, storm phobia, and aggression toward human and/or other dogs, has recently become more widely recognized. Problem behaviors started to gain attention as in the United States of America, more dogs were euthanized for such behaviors than for all other medical causes combined (Landsberg et al., 1997). In more recent years, approximately 3.3 million dogs enter shelters every year, approximately 670 thousand shelter dogs are euthanized every year, and biting accounts for 3% of the reasons for dog relinquishment (moving is the top reason and accounts for 7%) (The National Council on Pet Population Study and Policy, 2013; The American Society for the Prevention of Cruelty to Animals, 2017). Approximately, 14% of all dog relinquishments to shelters in Japan in 2006 were due to problem behaviors (Advisory Body for Management of Animal Welfare, 2006), and in 2013, the corresponding figure was 20.8% (Okuda et al., 2013). Accordingly, behavioral problems in dogs have been recognized as an important issue in recent times.

In dogs, anxiety disorders can be caused by numerous factors including separation (from owners and/or other dogs), storms, specific people or other entities or events, and more generalized/ill-defined influences. Dogs with anxiety disorders can exhibit excessive barking, elimination in inappropriate places, destructive behavior, aggressive behavior, and self-harming behavior (Landsberg et al., 1997). Living with a dog exhibiting one or more of these behaviors can exert a heavy burden on the dog's owner, and may ultimately cause the owner to relinquish or euthanize the dog.

Many studies investigating problem behaviors in dogs have reported associations between aggressive behavior and environmental factors and experiences. It has been suggested that there are

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associations between aggressive behavior and physical or positive punishment (Hiby et al., 2004; Tami et al., 2008; Herron et al., 2009; Arhant et al., 2010; Casey et al., 2014), positive reinforcement (Yin et al., 2008; Deldalle and Gaunet, 2014), attending training school (Bennett and Rohlf, 2007), attending puppy class (Casey et al., 2014), socialization before adulthood, that is, as a puppy (Howell et al., 2015), and prevention of problem behaviors in puppies (Gazzano et al., 2008). In these previous studies, physical and positive punishment increase aggressive behavior and the others (e.g., positive reinforcement) decrease aggressive behavior. Most of these previous studies focused on training school or puppy class. Because anxiety can lead to aggressive behaviors (Landsberg et al., 1997), it is possible that training experiences or a lack thereof may be significantly associated with the development of anxious behaviors, potentially including aggressive behaviors.

Some previous studies have investigated effects associated with multiple dogs living together in the same residence, and the presence of children living in the same residence while the dogs were puppies. In some of these studies, aggressive behavior was reportedly increased by the presence of children (Guy et al., 2001) and other dogs (Hsu and Sun, 2010). Although there are multiple causes of aggressive behaviors, it is clear that they can include anxiety and/or fear (Landsberg et al., 1997). Therefore, some of the aforementioned results may reflect aggressive behaviors caused by anxiety and fear.

The aim of the present study was to investigate the effects of attending puppy class, attending training school, living with other dogs, and the presence of children when dogs were puppies on anxious behaviors.

Materials and methods

The present study was approved by the Research Ethics Committee of Tokyo University of Agriculture and Technology (approval number is No. 27-36). Study questionnaires were administered to participating dog owners after obtaining their informed consent. The questionnaire was designed specifically for use in the present study. The items in the questionnaire were classified into two sections: basic information pertaining to the dog, and anxious behaviors and training pertaining to the dog. Basic information included the dog's breed, sex (intact males, castrated males, unspayed females, spayed females), age, age when the owner acquired the dog, the source of the dog (pet shop, breeder, acquaintance, shelter others), information pertaining to pregnancy and/or rearing of pups (female dogs only, yes/no), whether the dog lived with other dogs (yes/no), and medical history.

Information about displaying anxious behavior in the following situations was obtained: "separation" (when the dog is at home alone or the owner prepares to leave), "storm" (when the dog hears thunder or the sound of a storm), "fireworks" (when the dog hears fireworks), "sound" (when the dog hears loud or strange sounds other than storms or fireworks), "subject" (when the dog sees specific people or objects, or is taken to specific places), "never relax" (the dog is anxious all the time), and other situations (yes/no). Other items relating to anxious behavior and training included the dog's age when anxious behaviors were first noticed by the owners, and whether the dog was easily startled (yes/no), had attended puppy class (yes/no), was attending or had attended training school (yes/no), and had lived with a child under the age of 7 years while the dog was under 1 year of age (yes/no) (Guy et al., 2001).

We distributed the questionnaires to dog owners at parks in Tokyo and Kanagawa. The questionnaire was given to dog owners that walked their dogs or used a dog park.

A generalized linear model with binomial distributions was utilized to determine whether factors such as puppy class and training school attendance were associated with anxious behaviors. Response variables included whether the dog showed anxious behavior in each situation. Explanatory variables included breed, sex, age, age when the owner received the dog, source of the dog, and whether the dog had attended puppy class, was currently attending or had previously attended training school, lived with other dogs, and had lived with children under the age of 7 years while the dog was under 1 year of age. We performed stepwise model selection and adopted the model with the lowest Akaike's information criteria (AIC, index of appropriate model). For selected models, we used likelihood ratio tests to assess significance, and a multiple comparisons test with Holm's correction to detect significant differences between groups. We utilized the lmer function of the R software package (version 3.2.1) for this analysis.

Results

We obtained data from 307 dogs, including 267 purebred dogs (57 breeds) and 40 mixed breed dogs. Breeds represented by fewer than 5 dogs were grouped together as "other". The mean age of the dogs was 45.7 months (3 years and 9 months), and the mean age of the dogs when the owners received them was 5.0 months. On the basis of a previous study, the dogs were classified into 4 groups according to age, juvenile (<2 years), young adult (2 years-4 years and 11 months), adult (5 years-7 years and 11 months), and senior (>7 years and 11 months) (Lit et al., 2010). Similarly, based on Houpt (2011), the dogs were classified into 4 groups according to age when the owners acquired them, puppy 1 (<1 month), puppy 2 (between 1 and 2 months), puppy 3 (between 2 and 3 months), and puppy 4 (>3 months, up to 80 months in this study). There were 43 intact males, 123 castrated males, 42 unspayed females, and 99 spayed females. With regard to source, 170 dogs were acquired from pet shops, 101 from breeders, 11 from acquaintances, 15 from shelters, and 10 from other sources. No data pertaining to pregnancy, rearing of pups, or medical history were provided; thus, this information was excluded from the analysis.

Anxious behaviors reported by the dog owners were "separation" (n = 79; 25.7%), "storm" (n = 95; 30.9%), "fireworks" (n = 63; 20.5%), "sound" (n = 158; 51.5%), "subject" (n = 41; 13.4%), and "never relax" (n = 5; 1.6%). 67 dogs (21.8%) were reported to show no anxious behaviors. Because only 5 dogs in total were reported to be in the "never relax" behavioral category, we excluded this category from further analysis.

Based on the results of stepwise model selection, models including the following explanatory variables were selected as those with the lowest AICs: attending training school for "separation", age and attending training school for "storm" and/or "fireworks", living with other dogs and having lived with a child aged under 7 years while the dog was under 1 year of age for "sound". For "subject", a null model was utilized (no explanatory variables were selected because none of them affected "subject"). The likelihood ratio test results are summarized in Table 1. There were significant associations between "storm" and age, "storm" and attending training school, "fireworks" and age, and "fireworks" and attending training school. In the multiple comparisons test, there were significant differences between juveniles and other groups with regard to "fireworks", but there were no significant differences between any groups with regard to "storm" (Figures 1A, 2A). Attendance at training school significantly decreased anxious behaviors in response to "storm" and "fireworks" (Figures 1B, 2B). No other significant associations were detected.

Discussion

In the present study, attending training school significantly decreased anxious behaviors in response to storm and fireworks

Table 1
Multiple comparisons test results

Response variable	Explanatory variable	Group	d.f.	Deviance	Pr (>Chi)
Anxiety					
	Training school		1	2.4178	0.12000
Separation					
	Training school		1	2.7778	0.05194
Storm					
	Age		3	8.8794	0.03094[a]
		Juvenile vs. young adult	1	5.4897	0.01913
		Juvenile vs. adult	1	4.5944	0.03208
		Juvenile vs. senior	1	5.5524	0.01846
		Young adult vs. adult	1	0.1575	0.6915
		Young adult vs. senior	1	0.4023	0.5259
		Adult vs. senior	1	0.0510	0.8214
	Training school		1	7.9808	0.004921[b]
Fireworks					
	Age		3	17.4800	0.0005631[c]
		Juvenile vs. young adult	1	10.606	0.001127[b]
		Juvenile vs. adult	1	9.2203	0.002394[b]
		Juvenile vs. senior	1	11.632	0.0006486[b]
		Young adult vs. adult	1	0.4109	0.5215
		Young adult vs. senior	1	1.0641	0.3023
		Adult vs. senior	1	0.1528	0.6958
	Training school		1	4.5598	0.03273[a]
Sound					
	Other dog		1	2.4284	0.1192
	Children		1	2.2936	0.1299

d.f., degrees of freedom; Pr, *P* value of a likelihood ratio test.
Items that were significantly associated with each anxious behavior are indicated by asterisks.
[a] $P < 0.05$.
[b] $P < 0.01$.
[c] $P < 0.001$.

(Figures 1B, 2B). These results are consistent with a previous study in which training reportedly reduced anxious behaviors (Jagoe and Serpell, 1996). In another previous study, cortisol decreased by 20% after training (Vasconcellos et al., 2016), and it was suggested that dogs attending training school exhibited anxious behaviors less frequently because of lower stress levels. Notably, however, in other previous studies attending training school did not affect the number of problem behaviors observed, or the reasons for relinquishment (Salman et al., 2000; Blackwell et al., 2008). These previous studies investigated not only anxious behaviors but also aggressive behaviors. It was suggested that attending training school had different effects on the two types of behaviors.

Exhibiting anxious behaviors in response to fireworks was significantly associated with age and dogs over 2 years old showed anxious behaviors more frequently than dogs under 2 years old (Figure 2A), but there was no significant association between storm and age, in contrast to a previous study (Kurachi et al., 2017). In that previous study, there was a significant difference between juvenile and senior dogs with regard to exhibiting anxious behaviors in response to storm. It may be that the effects of age on responses to storms are not as strong as the effects of age on responses to fireworks.

There were no significant associations between subject and source in the present study, in contrast to a previous study (Kurachi et al., 2017). In that previous study, there were significant differences between dogs acquired from pet shops and shelters, and between dogs acquired from breeders and shelters. In the previous study, dogs from shelters showed anxious behavior more frequently than dogs from pet shops or breeders. The reason for the discrepancy between the studies may be due to the relatively low number of dogs acquired from shelters in the present study.

In the present study, there were no significant associations between anxious behaviors and living with another dog, or living with a young child. These results are inconsistent with previous studies in which living with another dog reportedly reduced the likelihood of aggressive behaviors (Hsu and Sun, 2010) and increased the

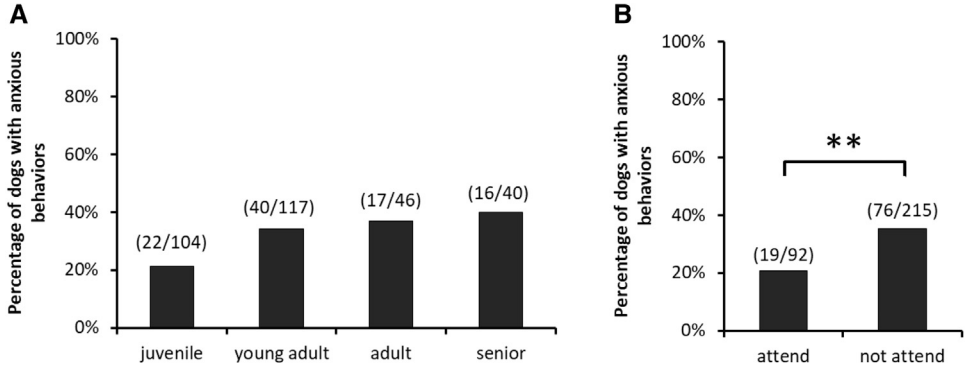

Figure 1. Associations between "storm" and (A) age and (B) attending training school. The numbers in parentheses represent the numbers of dogs exhibiting anxious behaviors and the total numbers of dogs in each group. $^{**}P < 0.01$.

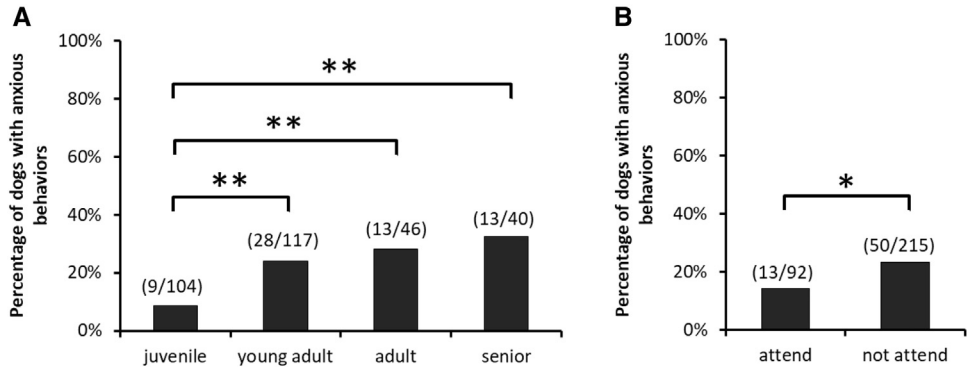

Figure 2. Associations between "fireworks" and (A) age and (B) attending training school. The numbers in parentheses represent the numbers of dogs exhibiting anxious behaviors and the total numbers of dogs in each group.*$P < 0.05$, **$P < 0.01$.

likelihood of excessive barking (Cross et al., 2009), and living with children increased the risk of aggressive behaviors (Guy et al., 2001). These previous studies included both anxious behaviors and aggressive behaviors. Living with another dog and living with a child may affect aggressive behaviors but not anxious behaviors. On the other hand, although there was no significant association between anxious behaviors and attending puppy class, this is not entirely inconsistent with previous study reporting socialization as a puppy is important for adult dog behavior but the effect of puppy class is not clear (Howell et al., 2015). It is necessary to investigate the effect of puppy class itself on dog behavior in further studies.

It is expected that attending training school decreases anxious behaviors by learning. Dogs can learn how to behave when they feel anxiety and/or fear by training. For example, using highly motivating rewards such as food, social attention, or toys to reward commands such as "sit-stay", the commands can be used to settle and calm the dogs when they feel anxiety and/or fear and they can behave appropriately (Landsberg et al., 1997). In that way, the dogs attending training school may learn appropriate behaviors when they feel anxiety and/or fear. We recommend that owners take a proactive role in enrolling their dogs in training school. Moreover, the association between age and fireworks may be due to decreasing hearing. Older dogs that are losing their hearing ability may feel disturbed and feel anxious about a change in barometric pressure or lightning. Sensitization to other stimuli could be the factor for this result.

Conclusions

In the present study, attending training school decreased some anxious behaviors. With reference to previous studies, although we did not investigate aggressive behaviors, the results of the present study also suggest that training, puppy class, living with another dog, and living with a child may affect anxious behaviors and aggressive behaviors differently. Whether effective prevention methods differ depending on the type of problem behavior remains to be determined.

We did not investigate the effects of the regularity or frequency of attending training school or the qualitative training content administered during such training sessions in the present study. The effects of these factors on anxious behaviors require investigation in the future.

In addition, we should consider investigating the general types of training that owners provide for their puppies. Because it is suspected many dogs do not attend structured training school and/or puppy class, it is important to know the effects of training by owners. It should be also investigated in the future.

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Ethical considerations

The Journal of Veterinary Behavior: Clinical Applications and Research encourages submission of multiauthor articles and those with acknowledgments that accurately reflect help received in the preparation of the manuscript or in the research and analysis.

Conflict of interest

The authors declare no conflicts of interest.

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